University College London, Institute for Risk and Disaster Reduction — Written Evidence (ARC0027)

Arctic Risks: Outcomes from an Arctic risk scenario meeting

Background

UCL Institute for Risk and Disaster Reduction (IRDR) is a trans-disciplinary research institute that leads research, knowledge exchange with industry and humanitarian agencies, and advanced teaching, in the area of risk and disaster reduction. The Institute's programme in Arctic Risk has strong links to the UCL Centre for Polar Observation and Modelling (CPOM), and collaborations with industry, the humanitarian sector and academia, in Canada, Norway and Svalbard, Russia, and Finland.

We believe that the risks associated with Arctic development often involve the overlap of disciplines and sectors. Based on this belief, we organized an Arctic Risk Scenario meeting on the 12th September 2014. Invited participants worked through two Arctic disaster scenarios. The scenarios chosen were: (1) a cruise ship sinking off north east Spitzbergen, and (2) an oil well blowout in the Kara sea. Participants came from the oil and gas industry, shipping, law, politics, humanitarian agencies and academia: one aim of the meeting was to bring together diverse perspectives on the Arctic.

Two invited speakers presented relevant background. Dr Nataly Marchenko (The University Centre in Svalbard (UNIS), and author of the book "Russian Arctic Seas") discussed a series of recent Arctic shipping near-disasters. Dr Rocky Taylor (C-Core, St John's, Newfoundland, Canada) discussed the complexities of oil exploration and production in Arctic seas, again based on a number of reference events. The rest of the meeting was held under the Chatham House Rule. Diverse views were expressed, and in this document we highlight topics of broad consensus and areas of disagreement.

This document highlights observations and outcomes from the meeting which may affect the UK's ongoing interests in Arctic development. Of the questions listed in the call for evidence, this submission is particularly relevant to numbers 1, 3, 5, 7 and 8.

Summary

- The Arctic has very significant commercial potential from mineral extraction, including oil and gas, shipping transport, fisheries, tourism, and forestry, and from the financing, development and deployment of the infrastructure necessary to support these industries.

- The pace of exploitation of the Arctic resources and opportunities is ever-increasing as the Arctic warms at a rate faster than any other region on Earth.

- There is a wide range of very significant risks in development and exploitation of the Arctic, including environmental, social, economic, and political. These risks are complex and interact, and their impacts have a range of timescales from immediate, to many decades.

- Some of these risks are illustrated through analysis of two case studies given below; a tourist ship sinking and an oil production blow out. These demonstrate that, whilst significant risk mitigation measures have been developed in recent years, serious issues remain arising from the remoteness, the limited distribution of safety support infrastructure, the extreme environmental conditions, and

a lack of key knowledge e.g. how to deal with oil under sea ice. These specific scenarios also highlight broader uncertainties regarding, for example, international cooperation and the regulatory framework in the Arctic.

- The UK has the capability to take advantage of the many opportunities and to contribute significantly to mitigating the risks, but needs to develop a robust, integrated plan (coordinated jointly by Government and business) as a matter of urgency.

1.0 Tourism and Cruise Ships

1.1 To predict the response to an Arctic sinking, we have to know the location and depth of the sinking; the legal jurisdiction and the political groups (government and other) involved; the immediate coastguard availability; and so on. Since the aim of the meeting was to understand dynamics which might occur following any Arctic sinking, we steered away from specific technical details and towards more general principles and trends. Overall, a future Arctic shipping disaster was not thought to be improbable. The *Costa Concordia* and *MV Explorer* were considered useful recent reference events. Our invited speaker Nataly Marchenko also discussed other recent crises involving fishing vessels and tankers in the Arctic.

Scenario 1 – An Arctic Cruise Ship Sinks

June 2015: a cruise ship is holed off the north-east of Svalbard by collision with an ice floe. The ship carries 300 passengers, mainly European, but also from East Asia and North America. The incident occurs at 0300. A mayday signal goes out at 0400. All passengers are evacuated and in lifeboats by 0800. Weather conditions are difficult, and a Norwegian Coastguard vessel reaches the scene at 1000. The ship is completely submerged by 1800.
Dimensions: Human safety, technology, logistics, communications, pollution, wreck removal, jurisdiction and geopolitics, cost and insurance, local and indigenous interests
Responses: Arctic tourism and the media; coastguard; shipping; governmental; public perception of the Arctic; legal; environmental…
Timescales: immediate; same season; the following summer; long-term.

*Wildcards***:** disaster tourism; the wreck is trapped for the winter; loss of communications; and severe regulatory change in Arctic shipping.

1.2 The incident as described had a nearby coastguard vessel which was able to reach the accident site within hours, and no life was lost. Participants felt that this was highly optimistic, since the Arctic has few ports and limited search and rescue facilities. There was confidence in the ability of the Norwegian authorities to respond. It was noted that Svalbard emergency services are to run a full-scale rescue exercise this winter. There was less certainty about the ship's crew: would they be trained in Arctic environments? Although the IMO's Polar Code should in the future take care of this aspect, many crews at the moment come from warm climates. The passenger demographic is likely to skew old, and the passengers and crew may not all share common languages. As well as taking a view of the whole, we must consider that each individual on board will need personal help. Survivability is highly dependent on the precise details of the sinking. Also, the recovery brings its own risks, particularly as coastguard ships and other well-meaning vessels enter an area which is known to be dangerous.

1.3 Norway has an excellent and ever-improving rescue helicopter network. However, accidents are likely to occur when the weather is poor, and so helicopters may be unable to help significantly in the rescue. With the retreating ice edge, ships are moving further away from land (looking for polar bears) and hence the range of each helicopter journey might be large. Further, Svalbard is well-placed for such rescues, but tourist boats may try to traverse the Northern Sea Route, for example, with increasing

"Accidents are increasingly likely to occur away from locations where rescue infrastructure is in place and organized."

regularity. Accidents are therefore increasingly likely to occur away from locations where rescue infrastructure is in place and organized.

1.4 The proposed scenario is, however, most likely to happen near popular tourist destinations (that's where the ships are). An accident will damage the local tourism industry (there was uncertainty about the extent to which the *MV Explorer* sinking was responsible for the recent strong downturn in Antarctic tourism.) In places like Svalbard, where tourism is a large part of the economy, this is likely to be the most significant local effect.

1.5 Media management is different in the Arctic, since it will be difficult or impossible to get journalists and photographers to the scene. This (along with general media trends) may lead to an increased reliance on eyewitness accounts and photography. How does this change the filter through which the world sees the event? *Costa Concordia* and MH370 were raised as evidence that both visibility and uncertainty will tend to keep events in the public eye and on the front pages.

1.6 In the medium term, the flag state of the vessel would produce a report on the incident, and this report would be submitted to the IMO. Some information might be concealed to preserve reputations. Depending on location the wreck might be removed or left. It might become a maritime grave.

1.7 In the scenario discussed, jurisdiction was clear (the Norwegian coastguard would be in charge) but there were still open questions about international cooperation. If the ship is largely populated by, say, American or Chinese tourists, those governments would certainly demand answers. A clear decision-making hierarchy is necessary, both immediately and in pollution control and wreck removal, but such a hierarchy may not be widely agreed (although immediate operations would be run out of Longyearbyen). Legal and contractual disputes are likely to be drawn out over many years. Every additional step in the recovery and cleanup – for example those discussed in our wildcard scenarios – increases the legal complexity and the difficulty in assessing what actually happened. There are very few precedents in the Arctic, and so insurance rates and actuarial calculations are somewhat speculative.

1.8 In extending the scenario, participants noted that much larger ships (up to 3000 passengers) are now visiting Svalbard. Capacity on coastguard ships would be much less than this, and the consequences could be disastrous. Some doubt was expressed about whether the passengers and crew (perhaps 500 people in total) in the scenario could be accommodated on any ice-class rescue ship. It was suggested that if jurisdictions wish to encourage high capacity cruise ships in their waters, they should be required to invest in adequate SAR capacity to respond to potential events in case of an emergency.

Scenario 2 – An Arctic Blowout

In mid-October 2016 a near-shore Arctic exploration well in the Kara sea experiences a blowout due to an unspecified technical failure during an extreme storm. The well is 1000km from the nearest large port and its well-equipped hospital. There is no immediate loss of life and all workers are evacuated to life vessels. Early estimates suggest the well is leaking around 1000 barrels/day. Ship access to the rig is likely to close in early- to mid-November.
Dimensions: human safety, pollution and cleanup, cost and insurance, technology and engineering, jurisdiction and geopolitics, local and indigenous interests
Responses: coastguard; technological; shipping; governmental and intergovernmental; media and public perception of the Arctic; legal; environmental…
Timescales: immediate; overwinter; spring; long-term.

Wildcards: storm drift complicates the rescue; concurrent leaks; takeover of the rig by an engineering NGO; and loss of market confidence in, and public enthusiasm for, Arctic projects.

2.0 Oil and Gas Exploration and Production

2.1 The risk of oil spills is often cited as a reason not to develop in the Arctic. It's one of Greenpeace's two pillars for opposing Arctic development (the other is the symbolic importance of preserving a wilderness). Oil spills (by volume) have decreased markedly in the past forty years, largely due to improvements in shipping technology (e.g. double hulls and advanced navigation tools), and storage technology, as well as increased regulation. Wellhead blowouts are sufficiently rare that trends are hard to interpret. However, Macondo/Deepwater Horizon reminds us that accidents are always possible. The Arctic has about 13% of the world's undiscovered oil reserves and as much as 30% of the world's undiscovered natural gas reserves. This is equivalent to several years' current global production, and we have yet to go one year globally without a notable oil spill. Policies geared towards zero harmful emissions are necessary, but we should also be prepared for spills. In the meeting, some participants made a convincing case that Macondo was an extreme outlier and that several safety measures have since been put in place; others observed that accidents seem to keep happening.

2.2 There are some important reference events which relate to Arctic development. One paper which was highlighted was "Kolskaya and Kulluk: a disaster and a near disaster" (Gudmestad, 2014). In both the *Kolskaya* and *Kulluk* incidents, towing a rig in high weather led to unexpected loss of stability. In the *Kulluk*, Shell was able to get all personnel to safety, while in the *Kolskaya* 53 people died. One conclusion of the paper is that "the companies' safety programs must be updated in the case of Arctic operations with an emphasis on the need for patience and an awareness of the costs for Waiting on Weather." These events serve as a reminder that extreme weather, as often experienced in the Arctic, is a contributor to risk. The mechanics of sea ice are also an important factor in Arctic risk, and this was evidenced by the ice-induced vibration of the *Molikpaq* and by structural failures in the Bohai sea. The presence of sea ice, and its management, affect disaster management plans as well as risk likelihoods. Seasonal variability further complicates the picture, since structures and vessels which are optimized for ice may not be optimized for open water, and vice versa.

"Extreme weather and the presence of sea ice lead to elevated risk in Arctic oil and gas development"

2.3 Developments in the Bohai sea also highlight some relevant trends. In the 1960s and 1970s, several structures failed. In the 1980s and 1990s, regulation and conservatism led to much stronger designs. However, current demands are leading to the development of more marginal fields, where costs must be minimized to make production economically viable. Will this lead to reduced safety margins? And are similar trends likely to hold in the Arctic? It was noted that research should help to reduce costs without reducing safety.

2.4 The proposed scenario details a substantial well leak which begins during the shoulder season, just before winter, when the well location (in the Kara sea) becomes inaccessible by ship (unless year-round icebreaker support is available). Similar scenarios – of a wellhead blowout which lasts a whole winter – are considered a worst-case. As with the previous scenario, the first priority is human life, and support vessels would be mandatory to evacuate personnel. Sea ice may complicate, for example, the deployment of lifeboats. Once human safety is managed, pollution control becomes necessary. Post-Macondo safety developments include improved blowout preventor systems; a mandatory local capping stack; a mandatory containment system; and the possibility of a rig on standby to drill a relief well. Oil in the environment can then be contained by some combination of mechanical recovery, subsea dispersants, sprayed dispersants and in-situ burn. Currents will affect the fate of the oil, and from north of the Kara Sea the oil might be drawn into the Fram drift. The interaction of oil with sea ice was a key area of uncertainty. Sea ice may trap the oil, reducing its dispersion but making it more difficult to manage, since oil under ice is difficult to remove. The presence of sea ice also makes it extremely difficult to track the oil as it spreads. Typically methods for skimming and burning oil have very low recovery. Added to this, burning oil will produce black carbon in the atmosphere, accelerating melting elsewhere in the Arctic. Monitoring is important, and the oil might be collected during the spring melt. Pollution, and events which pollute, can have a long lifetime: oil is still leaking back to the surface at the *Exxon Valdez* accident site.

"The interaction of oil with sea ice is a key area of uncertainty."

2.5 There was some suggestion that local effects may be slight. Local populations in northern Russia tend to onshore herding, as opposed to, say, west Greenland, where an oil spill could be hugely damaging to fishing and sealing. Perhaps, with this lack of local impact, clearup and rig removal are less urgent.

2.6 The international attendees of the meeting agreed that geopolitics was crucial to understanding the risk of oil spills. Risk management philosophy varies by region. Canada has a strong dialogue between industry, regulation, and academia, and was felt to have a good regulatory regime. In Russia, only Rosneft and Gazprom are allowed to operate. They have tended to collaborate with western companies who have strong Arctic experience. However, sanctions on Russia and fear of reputational damage may lead to European and North American companies withdrawing from the Russian Arctic. To some extent this is already happening, and the void is being filled by, for example, CNBC and PetroVietnam, who have less experience in polar waters. Severe worries were expressed that this is effectively a reduction in Arctic expertise, in the place where most development is occurring. This ties in to a broader question of whether overly strict local regulation simply moves development to less well-regulated regions.

"Geopolitics is key to understanding the risks of oil spills. Risk management philosophy varies by region."

2.7 Again, the control of information is crucial. Traditional media access will be limited, and first-person accounts will be promulgated through social media. Public perception of the incident, and trust in the regulatory regime, will vary internationally, but any hint of a coverup will damn all operations. The outcomes will be uncertain and worst cases will be reported. In discussing the final wildcard it became clear that public relations will heavily influence future development, insurance and regulation.

3.0 Broader Arctic trends, risks and opportunities

3.1 Priorities following an Arctic disaster mirror more general priorities. First, the focus is on the immediate safety of people involved in any incident. Once the direct and local human impact is understood and minimized, resources are moved into pollution reduction and control. Environmental risks - waste and spills - are contained and wrecks are removed. The next phase is reputation management, and views of the incident are presented in traditional and social media, corporate explanations, and political messages. The final phase is likely to be a litigative phase, in which blame is assigned and costs are allocated.

3.2 Although these four phases inevitably overlap, the consensus in the meeting was that they represent widely shared priorities: there was no suggestion, for example, that reputation management might be prioritized over technical management of the direct consequences of an accident.

3.3 Precedents in the Arctic are not always available, and there was a worry that standards and control measures may be implemented on a design-by-disaster basis. Several recent near-misses were discussed, and participants noted that there is always a measure of luck in avoiding a crisis, and a measure of bad luck in accidents. Have we just been lucky so far, and do we have a good system for measuring and understanding this?

3.4 In both scenarios, there was a strong sense that just one major accident may change the public and political will for Arctic development for decades. Even fairly minor incidents may change the regulatory climate such that Arctic projects become economically unviable. An Arctic disaster is in no-one's interests.

> **"There was a worry that standards and control measures in the Arctic may be implemented on a design-by-disaster basis."**

3.5 New International Arctic offshore design codes (e.g. ISO 19906, 2010) use a risk-based design approach to help ensure acceptable target safety levels are achieved in the design of offshore platforms for Arctic conditions (for example achieving comparable safety levels to those the public expects from the airline industry, etc.). The oil and gas industry is highly aware of the financial and reputational risks associated with Arctic development and operators understand very clearly that an oil spill in the Arctic could mean financial ruin for even the largest company. Correspondingly, Western companies have taken very conservative approaches to Arctic development and invested heavily in technology, training and the development of modern risk-based design codes (by comparison, Polar Class rules for Arctic ship design used by the shipping industry still follow a prescriptive philosophy, not a risk-based philosophy as has been adopted by the offshore industry).

3.6 Other risk scenarios could easily be developed: maritime conflict, slow pollution from Siberia, loss of biodiversity, an Arctic aircraft loss, terrorism. Gradual trends may also lead to new risks. For example, there was uncertainty about the effects of increased Arctic traffic and changes in global trade patterns. Onshore, melting permafrost may alter risks and opportunities over the next few decades. All these risks may have interconnections, and researchers were encouraged to keep an open mind.

3.7 One helpful frame was to consider different types of risk: reputational (*Exxon Valdez*), price (the effects of shale gas on the market), tax, environmental, socioeconomic (mining in Greenland), political (Russia and Ukraine), technological and exploration risk, and so on.

3.8 Arctic development offers important opportunities, both globally and locally. Diversity of energy supply is crucial, and obtaining oil from, say, Saudi Arabia or the Gulf of Mexico is not without complications. Arctic indigenous people are enthusiastic about well-managed development, in which proceeds are shared.

Appendix: participant list

David Alexander *(UCL IRDR)*
Tom Armitage – *(UCL CPOM)*
Jill Barrett *(British Institute of International and Comparative Law)*
Duncan Depledge *(Royal United Services Institute)*
Klaus Dodds *(Royal Holloway University)*
Dougal Goodman *(Foundation for Science and Technology)*
Ilan Kelman *(UCL IRDR)*
Ben Lishman *(UCL IRDR)*
Nataly Marchenko *(UNIS, Svalbard, Norway)*
Adrian Mundin *(UK Chamber of Shipping)*
Nina Poussenkova *(Sampo, Moscow)*
Kaj Riska *(Total)*
Alan Rodger *(Climate Change: Risk and Resilience)*
Peter Sammonds *(UCL IRDR)*
Mathijs Schmidt *(Shell / OGP)*
Sally Scourfield *(UCL IRDR)*
Rocky Taylor *(C-Core, St John's, Canada)*
Sam Thomas *(UCL CPOM)*
Emma Wilson *(Int. Inst. for Environment and Development)*
Guy Yeomans *(arcticfutures / arctic hub : london)*

Our thanks to the participants.

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